RECENT PROGRESS IN THERAPEUTICS.

By ROBERT AMORY, M. D.

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Jaborandi.[1]— The action of this drug has been explained by M. Gubler as follows: Jaborandi acts directly upon the cells in the salivary glands. From the very moment of its ingestion, these secretory cells are excited, and immediately a stimulation of the distal ends of the centripetal nerves ensues. This stimulation is transmitted to the reflecting centres, whence it returns to the glandular vaso-dilator nerves (*vaso-dilatateurs glandulaires*), whose function of keeping the vessels in a state of contraction then ceases, and these latter distribute to the secreting organs all the liquid demanded by their increased activity. M. Vulpian offers an objection to this theory on the ground that jaborandi is probably eliminated by the liver, and not by the salivary glands. This objection is based on the analyses made by E. Hardy. Other objections to the theory of M. Gubler are derived from physiology: after section of the lingual nerve above the place where its filaments are sent off to the glands, and again, after section of the pneumogastric nerve and of the cervical ganglion at the base of the skull, M. Carville has seen jaborandi produce a secretion of saliva from the submaxillary gland in as active a manner as in those experiments with these portions of the nervous system intact. Neither reflex vaso-dilating excitation nor the influence of the nervous system is necessary to induce the flow of saliva from the submaxillary glands. M. Vulpian attributes the flow of saliva and sweat to the fact that jaborandi paralyzes in the salivary and sudoriparous glands the distal end of the fibres coming from the sympathetic nerve.

Mr. Langley describes the action of jaborandi on the heart in the following words:[2] "If a few drops of the glycerine solution, or if one of the extracts, be injected under the skin of a frog or toad, the heart will become red and dilated, and the beat slower. These characters increase till the heart is of a dark red color, very much distended in diastole. I have invariably found that the ventricle stops beating before the auricles. According to Vulpian,[3] the auricles are the most readily

[1] See the JOURNAL for September 16, 1875; Revue des Sciences médicales, vi. 590; Baier ärtzliches Intelligenz-Blatt, xii. 16; Berliner medicinische Wochenschrift, xii. 18.

[2] Journal of Anatomy and Physiology, October, 1875, page 187.

[3] London Medical Record, July, 1875.

affected ; this certainly is not the case if it be taken to mean that the auricular beats are the first to cease. It does, however, not unfrequently happen that the auricles are the first to show the effects distinctly, beating only in every alternate heart-cycle. This has been most frequently observed after the aqueous extract has been given. At a later stage the heart-beats generally become very irregular, at one time the auricles contracting only in every alternate heart-cycle, at another the ventricle, then perhaps a complete stoppage of both occurring, followed by a few normal beats. Moreover, in point of energy the different parts of the heart-beat seem to be independent of one another ; at one time the auricles contract feebly and the ventricle strongly, at another exactly the contrary. But with all these variations the ventricle has always in the many animals I have examined been the first to finally cease contracting. . . . Atropia sulphate quickly restores the heart-beat, but with less and less readiness as the heart has been stopped for a longer time. The restored beats are at first feeble, then get stronger till an almost or quite normal beat takes place. The auricles show this effect most strikingly, and not unfrequently the auricular beat will be resumed on injection of atropia sulphate, but not the ventricular."

The preparations of this drug used by Mr. Langley contained alcohol and glycerine ; and, in order to prevent any misunderstanding in regard to the effects induced by these preparations, he eliminated from his results the effects which were caused by administering alcohol and glycerine alone. He remarks also that the aqueous extract of the alcoholic residue appears to have all the properties of the alcoholic extract.

Having shown by his experiments that there is an initial exalting influence of the inhibitory action of the sympathetic nerve after the exhibition of this drug, and that this is succeeded by exactly the contrary, or a paralyzing effect, Mr. Langley offers a partial explanation of these contradictory results, and suggests that the alkaloid pilocarpine is not the only substance which contains the active principle of jaborandi, because this exalted inhibitory action of the sympathetic nerve on the heart's pulsation does not follow the use of nitrate of pilocarpine. " Nor is there any stoppage of the heart's action by an increased stimulation of the pneumogastric [by means of a Du Bois Reymond induction coil], if the strength of the shocks be increased. Two or three drops of a five per cent. solution of nitrate of pilocarpine are sufficient to produce this state. Further, it will be found that stimulation of the sino-auricular line will no longer stop the heart. Here then we have a substance which, as it is usually expressed, paralyzes the inhibitory fibres of the pneumogastric. Now this substance is contained in jaborandi in very small quantity, and consequently, when jaborandi is given, the pilocarpine contained in it requires some length of time before it can produce

its proper effects; hence it is not until a late stage that we find the inhibitory fibres paralyzed."

Experimenting still further by placing an extract of jaborandi in direct contact with different portions of the heart tissue, Mr. Langley observed that the muscular tissue thus in immediate contact with the extract ceased its efforts at pulsation and became pale and contracted. This tonic contraction ensued after the topical application of the aqueous as well as of the alcoholic extract, and consequently could not be attributed to the action of alcohol. Moreover, after wiping away the jaborandi extract from the ventricle, after this phenomenon had been observed, and then sponging that organ with atropia solution, "its pale, contracted condition gave place to one of flaccidity." Reasoning upon the basis of his own experiments and of those by Vulpian on striated muscular fibre, Mr. Langley rejects the theory that jaborandi acts through the pneumogastric or any other nerve-fibres, and proposes as a simpler theory "that jaborandi (and therefore of course atropia also) acts directly on the whole neuro-muscular cardiac tissue, in what exact manner must be left for future inquiry."

Some of the practical points of the effect upon the circulation derived by Mr. Langley from his experiments are as follows: "Jaborandi, in whatever form injected, causes a slowing of the rate of heart-beat (whether the vagi are cut or no) and a fall of blood-pressure.

"The fall of blood-pressure does not depend solely on the lessened rapidity of the heart's beat. By injecting slowly, often the first effect visible is a fall of the blood-pressure without an appreciable slowing of the pulse. The fall then resembles in a remarkable degree that caused by stimulation of the central end of the depressor. . . . Moreover, when atropia is given, the blood-pressure does not rise to its former level, although the rapidity of beat be restored. Jaborandi given after atropia still causes a fall in the blood-pressure, though not so considerable as in the absence of atropia."

Dr. Craig states[1] that erroneous impressions prevail as to what portion of the drug contains the active principle; Rabuteau, of Paris, concluding that it resides in an alcoholic residue from an aqueous solution, and Mr. Martindale attributing it to the "dregs" (pieces of the stem, leaves, and petioles), the strained solution producing but little effect. Dr. Craig had prepared for his use in clinical experiments a substance called pilocarpine; but he does not give the method of its preparation. This substance, he says, "is of a semi-fluid consistence, of a yellowish color, and possessed of an agreeable odor. It is soluble in water, and is very active. One grain of this pilocarpin is nearly as active as one drachm of the leaves." Dr. Craig used small doses of the infusion every few hours, and in several cases of fever character-

[1] Edinburgh Medical Journal, January, 1876.

ized by a dry tongue and a parched mouth he was enabled to restore the flow of saliva and to keep the mouth and tongue moist. "He has never found jaborandi affect much either the heart's action or the temperature of the body, and he has watched carefully for the disturbance of the vision observed by Mr. Martindale and others, but as yet has failed to observe it. He believes that many of the untoward results ascribed to jaborandi are due to the fact that dregs have been swallowed in addition to the strained infusion."

Dr. Craig believes it to be a very valuable drug for removing pleuritic effusions.

According to MM. Bochefontaine and Galippe, the bark is the most active portion of jaborandi. MM. Hardy [1] and Vulpian [2] also note that the active principle of the plant is an alkaloid which can easily be separated from an infusion of the leaves and bark. This alkaloid, pilocarpine, may be isolated by means of phospho-molybdic acid, or by ammonia. Hardy and Vulpian found that its effect on the heart and salivary glands was similar to that caused by the infusion of the stems and leaves of jaborandi. The proportion of this alkaloid in jaborandi is but 0.75 per cent.

Cholagogue Action of Aloes, Podophylline, Rhubarb, Calomel, and other Cathartic Medicines. — In the report of a committee of the British Medical Association in regard to the amount and character of the bile which flowed from permanent biliary fistulæ in dogs that were subjected to a fixed diet and to the administration of various substances, it is stated [3] that "spontaneous diarrhœa, dysentery, and purgation, produced by pilula hydrargyri, calomel, corrosive sublimate, and podophylline, always diminished the solid constituents of the bile, and, with one exception, the fluid portion of the bile also."

Röhrig [4] observed that in fasting animals subjected to the calming action of curare, croton-oil in large doses increased the secretion of bile, and that colocynth, jalap, aloes, rhubarb, senna, and magnesia sulphate likewise had some effect in increasing the flow of bile, the amount of influence from each being in the order above stated; moreover, the use of calomel rather tended to promote the flow of bile if given during the secretion, but would not originate the secretion after it had ceased. In commenting upon these results Dr. Rutherford and M. Vignal [5] observe that "Röhrig's statement with regard to calomel does not much differ from that made by Hughes Bennett's committee, and he made no experiments with podophylline and taraxacum, nevertheless,

[1] Gazette médicale, iv., 1875, page 309.

[2] Le Progrès médical, 1875, page 229.

[3] British Association Report, 1868, page 229.

[4] Experimentelle Untersuchungen über die Physiologie der Gallenabsonderungen, Stricker's Jahrbücher, 1873, page 240.

[5] Journal of Anatomy and Physiology, January, 1876.

he did find that certain purgative agents, when given to animals that are fasting, increased the biliary secretion, while the committee found that in non-fasting animals, purgative action induced by podophylline, calomel, etc., diminished the amount of water and solids of the bile secreted in the twenty-four hours."

Not being satisfied with the condition of the subject, Dr. Rutherford, who was the reporter of the committee of the British Association, has performed, with the aid of M. Vignal, some additional experiments upon dogs that had in nearly every instance fasted about eighteen hours. These animals were curarized and artificial respiration established, after which the abdomen was opened along the linea alba, and a glass canula inserted into the biliary duct near its junction with the duodenum. The bile was then allowed to flow into a fine cubic-centimeter measure, and a record was kept of the quantity secreted every fifteen minutes. In many cases this bile was analyzed, and the alimentary canal was examined post mortem. The errors which are liable to occur from mechanical obstruction to the flow of bile or from an irregularity in the movements of artificial respiration were eliminated as carefully as possible. Curare was used on account of its property of paralyzing voluntary movements, and with proper care and doses the biliary secretion was not apparently affected by this medicinal agent. As a still further caution, the animals were allowed to recover from the surgical operation, before the regular record was taken. The curare solution (one minim to each milligramme of water) was always injected into the jugular vein.

Controlling experiments upon the curarized dogs, in which no other medicine was administered, were first made in order to establish the proper rate of secretion and the character of the bile. It is to be noted that in these experiments the composition as well as the quantity of the bile was nearly constant. The results of the experiments on the various cholagogues may be thus summarized : —

(1.) *Croton-Oil* in almond-oil (fifteen grains to sixty minims, six grains to sixty minims, three grains to sixty minims) showed very little, if any, increase in the amount of bile secreted during two or three hours after its injection into the duodenum. In the experiment with the largest dose, the autopsy revealed impending purgation in the small intestines, whilst in that in which the smallest dose was given there was no evidence of purgation.

(2.) *Water* injected into the duodenum appeared to have no effect upon the biliary secretion.

(3.) *Podophylline* in an aqueous solution (of a strength varying from six grains in nine centigrammes of water to ten grains in ten centigrammes of water) caused an increased flow of bile, commencing one hour after the injection into the duodenum and attaining its maximum

in three or four hours; but at the end of six hours the flow became perceptibly less. This drug produced an increased vascularity in the upper portion of the small intestine, and also other evidences of slight purgation. Presuming that the slight purgative effect was due to the insolubility of podophylline in water, other experiments were made with this drug dissolved in bile. This caused a very serious purgation, and a very rapid increase in the amount of bile, but in an hour and a half afterwards this increase was succeeded by a very rapid diminution. An analysis of the bile secreted after the podophylline showed that the especial bile-solids were not diminished, whilst the amount of mucus secreted was materially lessened. In short, the action of podophylline may be summarized thus: (1.) When injected into the duodenum of a fasting dog, it increases the secretion of bile. (2.) "When the bile is prevented from entering the intestine, podophylline acts less powerfully and less quickly than when bile is introduced." (3.) A severe purgative action diminishes the amount of bile secreted. (4.) Purgation from podophylline is probably due to a local action. (5.) "The bile secreted under the influence of podophylline, although it may be in increased quantity, contains as much of the special biliary matter as bile secreted under normal conditions."

The action of *aloes* was as follows: "(1.) Sixty grains of the extract of Socotrine aloes, when placed in the duodenum, powerfully stimulated the liver. (2.) Under its influence the liver excreted a greater quantity of biliary matter in a given time, although the bile was rendered more watery. Coincident with the marked action on the liver, there was only a slight purgative action."

Rhubarb was shown to be a very remarkable hepatic stimulant, doses of from seventeen to thirty grains never failing to increase the biliary secretion within half an hour after administration, and far less intestinal irritation occurred than after the use of aloes and podophylline. The percentage-amount of the special biliary matter was not diminished by rhubarb.

Senna was shown to be less powerful than rhubarb as an hepatic stimulant, and rendered the bile more watery.

Colchicum acted as a hydro-cathartic, and increased the amount of biliary matter excreted by the liver, but rendered the bile more watery.

Taraxacum and *scammony* were very feeble hepatic stimulants.

Calomel gave the following results: "(1.) An increase of the biliary secretion followed the administration of two successive doses of ten grains of calomel in one case. Diminution of the secretion was the only result of the same doses given under similar circumstances in two other cases, and it was the most definite result of the administration of four successive doses of three grains in another case. (2.) In all the four experiments the calomel had a purgative effect. (3.) Analysis of

the bile secreted during calomel-purgation showed that notwithstanding a diminution in the quantity of bile secreted, the percentage-amount of solids had become less."

Gamboge, a hydro-cathartic, diminished the secretion of bile, thus acting in a contrary manner to colchicum, which is also a hydro-cathartic.

Castor-Oil has scarcely any effect on the hepatic secretion, and this result was similar to that obtained by Röhrig.

Thus it will be seen that podophylline, rhubarb, aloes, and colchicum are the most active stimulants of the dog's liver; and, moreover, Dr. Rutherford states that "the increased discharge of bile was not owing to contraction of the gall-bladder, for this in all cases had been well-nigh emptied by digital compression, after which the cystic duct was clamped at the beginning of the experiment." In comparing these experiments on fasting animals with the experiments of Hughes Bennett's committee on non-fasting animals, Dr. Rutherford further states that the above substances excite the liver to secrete more bile. If purgation result, the absorption of biliary matter and of food — if digestion be taking place — from the intestine is probably diminished. Thus by the twofold operation of increased hepatic action and diminished absorption of biliary matter from the intestine, the composition of the blood as it passes through the portal system is probably rendered more pure. He moreover suggests a point of great practical interest: namely, "That powerful purgative action tends to diminish the biliary secretion." It must be borne in mind that the foregoing experiments directly apply to the healthy dog only.

Hypodermic Injection of Hot Water for the Relief of Pain. — Dr. Griffith[1] accidentally discovered that the hypodermic injection of hot water following an injection of a small dose of morphine would relieve pain. He gave these injections to several patients who had been in the habit of taking morphine, and the procedure resulted in "the great improvement of their health and the weaning them from the baneful poison." When this plan failed he would inject a small dose of morphine first, and follow that up with the use of hot water in two, three, or four hours. For the cure of sciatica and deep-seated pain, he found the hot-water injections most beneficial. In some instances "he pushed the needle up to its very end into the tissues, and forced in the water amongst the muscles, and then withdrew the instrument immediately afterwards, placing the tip of the finger on the perforation point, and, by a rolling movement, dispersing the fluid in its bed." He frequently has cut short acute attacks of lumbago, sciatica, and the pain resulting from a sudden strain or fall.

Salicylic Acid. — This substance, which formerly was obtained from

[1] British Medical Journal, December 4, 1875.

wintergreen, has recently and at a comparatively small cost been separated from phenol by a process devised by Kolbe,[1] who determined its physiological action also. "Given in large doses, six grammes in two days" (92.76 grains), "salicylic acid produces singing in the ears, and passes out in the urine, partly as salicyluric acid, partly unchanged; it may also be detected in two hours, and even after twenty hours, in urine, although the dose may be only 0.3 gramme (about five grains). Owing to the fact that it is easily decomposed into phenol and carbonic anhydride, it acts antiseptically, preventing fermentation and decomposition."[2] Its presence in the urine may be detected by chloride of iron and the precipitation of iron by phosphoric acid, which shows a violet reaction. It seems to arrest or interfere with the action of fermentation and the decomposition of the organic ferments. Although, outside of the body, the admixture of a one per cent. solution of salicylic acid may arrest the action of ptyaline on starch, and interfere with the digestive action of pepsin,[3] Kolbe observed in his experiments that the ingestion of fifteen or twenty grains was not followed by symptoms of dyspepsia.

At the Berlin Medical Society,[4] after the reading of a paper by Senator on the Antifebrile Action of Salicylic Acid, a good deal of discussion ensued upon the mode of administration, most of the speakers considering the forms of powder or emulsion undesirable, while the quantity of water required, on account of the great insolubility of the acid, was also objectionable. Glycerine was generally recommended, and it was stated that fifty parts of this and fifty of water constituted a vehicle that held the acid in permanent solution.[5] Salicylic acid is easily soluble in ten parts of cold alcohol; if water is added to this alcoholic solution, the salicylic acid will fall down in the form of a milky-white, fine precipitate; but if a small quantity of glycerine (equal in amount to the alcoholic solution) first be added, water may then be superadded without any separation of solid matter. In this form, the author of this report has administered the medicine to a child fourteen months old, who had secondary diphtheria as a complication of measles. A solution containing half a grain was administered every three hours, and was followed in twelve hours by the entire disappearance of the false membrane, and a reduction of the temperature two and a half degrees F. Apparently no irritation of the intestinal tract followed its use, though the use of the medicine was continued for three days, and gradually discontinued. Amelioration of very bad symptoms of the disease continued. No other medicinal agent was used. One very offensive liquid fæcal dejection occurred twenty-four hours after the first dose was given, but subsequently the discharges became natural.

[1] Journal für praktische Chemie, x. 89, 1875.
[2] Watts's Dictionary of Chemistry, 1875.
[3] Miller, Philadelphia Medical Times, 1875, 377.
[4] Berliner klinische Wochenschrift, August 16, 1875.
[5] Medical Times and Gazette, September 18, 1875.

Paul Fürbringer[1] observed that this drug produced no change of temperature in ten rabbits (one-centigramme doses), and in six men, (twenty-five centigramme doses), all of whom were in good health. In the septic fever produced by the inoculation of putrid liquid he noted the range of fever until it disappeared. Some days later, when the animals had recovered, he repeated the inoculation and administered the salicylic acid: this was followed by a diminution in the fever, commencing from two to six hours after the first dose. In the treatment of fever associated with phlegmasia, the results of the administration of salicylic acid were negative; whilst, on the other hand, in fever depending upon suppuration a notable defervescence followed the ingestion of this substance.

On account of its imputed property of preventing the development of ferments, K. Fontheim[2] employed salicylic acid in those diseases which are characterized by a morbid development of inferior organisms, especially in diphtheria. Until the close of October, 1875, he used in this latter disease the local application of sponges soaked in alum or carbolic acid, with the result of five deaths out of a total number of one hundred and seven cases of diphtheria; the most obstinate of these cases lasted from nine to fifteen days, and the most favorable from three to seven days. Since last October he has used topical applications of salicylic acid instead of carbolic acid; of the thirty-two cases of diphtheria treated in this way, the most severe lasted eight days, and the most favorable only three days. He concludes that the salicylic-acid treatment cut short the disease. The strength of his solution was two parts of salicylic acid dissolved in sufficient alcohol, and two hundred parts of water then added. The use of this solution as a gargle was a successful prophylactic against diphtheria to those exposed to contagion.[3]

The experience of Wagner[4] points to the same conclusion, and he states, moreover, that for the purpose of disinfecting the contents of the stomach and intestines it is far superior to other agents, for none of the latter can be prescribed in such large doses. But, on the other hand, Schüler concludes, from his experience in a limited number of cases treated respectively by carbolic acid and salicylic acid, that the former substance is more successful than the latter in the cure of diphtheria.[5] Zürn[6] administered one gramme of salicylic acid to dogs every day for several days, giving the last dose just before they were killed,

[1] Untersuchungen über antifebrile Wirkung der Salicylsäure, in Sonderheit über die temperaturherabsetzende Kraft bei septischen Fieber; and Revue des Sciences médicales, July 15, 1875.

[2] Journal für praktische Chemie, xi. 211, 1875.

[3] See also the JOURNAL, February 10, 1876, page 151.

[4] Praktische Beobachtungen über die Wirkung der Salicylsäure in the Journal für praktische Chemie, ii. 57.

[5] JOURNAL, February 10, 1876, page 152.

[6] Journal für praktische Chemie, ii. 215.

and observed, post mortem, no inflammation of the intestinal mucous membrane. The medicine was dissolved in from one hundred to two hundred parts of water. This same solution destroys the life of acari and other similar parasites in from twenty to twenty-five minutes. A very dilute solution of this acid does not destroy germs of fermentation so readily as its concentrated solution.

Steplsanides[1] has used this medicinal agent in very small doses (amount not stated) in a potion with laudanum for the cure of an obstinate attack of dysentery which would not yield to the usual treatment; he obtained complete success. He used at the same time enemata containing the same substance and a few drops of laudanum. This method of treatment was based on the theory that dysentery was a diphtheritic or parasitic disease.

Its use in polyarthritic rheumatism in Traube's clinic by Stricker has been presented to the readers of the JOURNAL,[2] and in an article by Dr. Putnam,[3] and is still further confirmed by Senator.[4] The latter also prescribed with success salicylate of soda in doses of from seven and a half to ten grammes, either all at once or in divided doses at short intervals. Yet this treatment did not prevent relapses or local inflamed joints; in two such cases subcutaneous injection of carbolic acid had a marked benefit. Katz[5] also confirms Stricker's observations.

Hypodermic Injection of Carbolic Acid for Polyarthritic Rheumatism. — Senator[6] has used a three per cent. solution of carbolic acid injected into the subcutaneous cellular tissue in the inflamed joints in twenty-five cases. In one hundred and fifty separate injections, no pain, inflammation, or abscess occurred, but he never employed more than three simultaneous injections, and nine centigrammes was the largest amount injected at one time; the treatment lasted six and eight days, with intermissions of several hours between the injections. The result of this treatment was relief to the pain and diminution of the swelling; it was more uncertain in the metacarpal and phalangeal joints, but in the larger joints, especially the shoulder, one injection was generally sufficient. Relief followed in an hour, and the more acute the disease the greater the relief. Little if any benefit occurred to chronic cases. The same treatment was applied to myalgiæ. Neither recurrence of the symptoms, abatement of the fever, nor induction of perspiration was effected by this treatment, but only transitory and palliative relief to the local inflammation.

[1] Wiener medizinische Presse, April, 1875.
[2] JOURNAL, February 10, 1876, page 164.
[3] JOURNAL, February 24, 1876, page 212.
[4] Berliner klinische Wochenschrift, No. 6, 1876.
[5] Deutsche medicinische Wochenschrift, No. 4, 1876.
[6] Berliner klinische Wochenschrift, No. 6, 1876.

Aconite and Aconitia (Aconitine).[1] — The variability in the strength of aconite and its preparations has become so well known that M. Oulmont has undertaken a revision of the pharmaco-dynamical and therapeutical properties of this medicament. His experiments were conducted on dogs and confirmed by clinical observations in human beings; he deduces the following conclusions: —

(1.) The activity of aconite varies, according to the portion of the plant selected;

(2.) According to the country in which the plant grows, and period of growth (more active before flowering than after);

(3.) According to the method of preparing the medicine.

Generally speaking, the leaves, stems, flowers, and seeds have an uncertain action, and may in some instances have no action whatever. The root contains the active principle, the activity of which varies according to the country from which the root is gathered. Cultivated aconite has less activity than that gathered from the mountains; of the latter, that gathered from the Swiss mountains is more active than that from the Vosges mountains (Alsace). Alcoholic tinctures of the flowers and stems may be given to animals in doses of thirty or forty grammes (about eight ounces) without any appreciable effect. On the other hand, alcoholic tinctures of the fresh root should be prescribed only in small doses, on account of its inequality of action, which is in proportion to the water of vegetation present in the roots. Tinctures, both of the leaves and of the roots, have an unequal and uncertain action. The extract from the Vosgian aconite has a uniform strength; two or three centigrammes can be daily and gradually increased to fifteen centigrammes without fear of accident. But that from the Dauphiné district (near Savoy) should not be used, on account of the difficulty of fixing a safe dose, and also on account of its violent activity.

Aconitia can hardly be said to represent the active principle of aconite, and on account of its variability in strength and the violence of its effect, if it is ever used internally, it should be very cautiously administered.

Franceschini[2] made some experiments on animals under the advice of M. Laborde. He used a substance called nitrate of aconitia (*azotate d'aconitine*). Aconitia in its amorphous state is insoluble and incapable of combining in the form of a salt; moreover, the local action of the alkaloid is so painful that its internal administration by the mouth seems forbidden. The production of crystallized aconitia by Duquesnel presents the opportunity of employing this substance in solution by the hypodermic method. Franceschini used the following formula: —

[1] Oulmont and Laborde, Académie de Médecine, December 14, 1875; Gazette hebdomadaire de Médecine et de Chirurgie, December 17 and 31, 1875.

[2] Thèse Doctorat, No. 369, Paris, 1875.

Nitrate of aconitia	10 centigrammes.
Distilled water	10 cubic centimetres.

The aqueous solution was hastened by the previous addition of a few drops of alcohol, and by adding the water gradually. He also used internally, by the stomach, granules of nitrate of aconitia in doses of half a milligramme ($\frac{1}{130}$ of a grain).

With regard to the effects of nitrate of aconitia, it was observed that in the lower animals there was at first (two or three minutes after the injection) a slight exaggeration of the phenomena of general sensation as shown by irritation of the nerve trunks; but the cutaneous sensation (bottom of the hind feet) diminished very rapidly. Even with such minute doses as one quarter of a milligramme the diminution of sensation was quite marked, and the point of a bistoury was thrust into the paw of a dog used for the experiment, without producing the slightest cry or reflex action. The period of exaggerated sensation was followed by that of anæsthesia, as soon as the drug was absorbed by the circulation.

In the human subject, after an injection of one fourth or one half milligramme a burning sensation was experienced, and the skin surrounding the puncture became red; this redness persisted for at least one half an hour, and then the peculiar acrid taste of aconite was perceived in the tongue, as well as the tingling of the lips, a sensation which extended to the extremities and finally over the whole surface of the body. On repeating the doses of one fourth to one half milligramme every three or four hours, the phenomena of irritation were less pronounced, and the therapeutical effects were more marked. Though aconite is eliminated somewhat with the urine, yet a portion is apparently destroyed or decomposed in the system. Great pallor of the skin of the ear of a rabbit followed the subcutaneous injection of one fourth of a milligramme, and the blood-vessels appeared almost devoid of blood and their interior calibre seemed abolished. After section of the great sympathetic in the neck, though the vessels were enormously distended, this pallor was as marked as before the section. The author of this thesis remarks that his experiments confirm in every particular the deduction of Professor Gubler, that "the marked disturbance in the functions of sensation leads to the conclusion that aconitia acts principally upon the nerves of sensation, whose functions it suppresses or reduces; but if anæsthesia is produced, the circulation is simultaneously calmed, the calibre of the capillaries is reduced, and the temperature is lowered." [1]

Deshaye [2] gives a detailed account of twenty-eight cases of typhoid fever treated with the alcoholic tincture of aconite at the Hôtel Dieu

[1] Journal de Thérapeutique, January 10, 1876, page 24.

[2] Gazette hebdomadaire de Médecine et de Chirurgie, September 24, and October 1 and 15, 1875.

de Rouen. In addition to these cases he cites twelve others treated by him outside of the hospital, and ten cases treated by Levasseur, a total of fifty cases, two only of which ended fatally. These fatal cases occurred after pneumonia, which came on in one instance after exposure at an open window during convalescence, and no perforation of the intestines could be detected at the autopsy of either case. The theory of the use of aconite in typhoid is based by Deshaye on the fact that the severe fever is due to an inflammation, and that aconite controls the elevation of temperature on the antiphlogistic principle. He repudiates the idea of its being a specific *sine quâ non* of typhoid fever, and cautions against its use in those cases which are characterized at the outset by severe adynamia and prostration. An improvement and sometimes complete subsidence of the temperature were noted in from ten to twenty days from the commencement of the treatment, and an abatement occurred within twenty-four hours after the first dose. On the subsidence of the fever, quinine was employed.

Among the immediate effects of the treatment, Deshaye mentions profuse perspiration, abundance and limpidity of the urine, speedy appearance of the rose-spots and sudamina, moisture of the tongue and mouth, and a peculiar furfuraceous desquamation of the skin. With regard to the rose-spots, he quotes Grisolle as saying that these are not critical and have no prognostic value ; and that a few hours after the administration of aconite a new and more confluent eruption occurs, coincident with more favorable symptoms. A liquid diet of beef-tea or veal broth was given, with the free use of ice. The aconité was administered at the very outset. The form of potion was —

℞ Aquæ destillatæ . . . . . 120 grammes.
Tincturæ aconiti . . . . . 1 gramme.
Aquæ aurantii florum . . . . . q. s. M.
Dose, one teaspoonful, p. r. n.

The author does not claim this as abortive, but as antiphlogistic treatment.

Electricity in Intestinal Obstruction. — M. Fleuriot reports[1] several cases of successful treatment in obstinate constipation and intestinal obstructions by the application of one electrode to the anus and the other to the abdomen.

Theory of the Action of Compressed Air.[2] — Dr. Schnitzer observes that the inspiration of compressed air and its expiration into a rarefied air increases the force of the heart's impulse, and consequently that the blood is driven into the arteries with increased pressure ; on the other hand, the reflux of the venous blood towards the right side of the heart is slightly obstructed. Thus the general effect of the use of com-

[1] Thèse inaugurale, Paris, 1875, No. 3, and Revue des Sciences médicales, January, 1876.
[2] Wiener Klinik, July, 1875, page 165.

pressed air as above described would be an increased amount of blood in the larger circulation, and its diminution in the lesser or pulmonary circulation. The inspiration of rarefied air causes a contrary effect: a diminution of blood in the larger or systemic circulation, and its increase in the lesser or pulmonary circulation. These results are modified, however, by the larger amount of oxygen absorbed by the inspiration of compressed air, and again by the larger product of carbonic acid produced by the expiration in a rarefied air. Another element still further complicates the result: the effect of pressure exercised upon the capillary circulation.

The therapeutical applications of the inhalation of compressed air are summarized by Dr. Schnitzer: the respiratory force may be increased, the pulmonary capacity may be enlarged and its ventilation promoted. The therapeutical indications are applicable to the following pathological conditions: (1) General feebleness of the respiratory organs; (2) chronic bronchial catarrh; (3) pulmonary catarrh and the first stage of phthisis; (4) emphysema; (5) nervous asthma, in which there is no organic lesion of the heart or lungs.